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103 There are names for every section of land, reef, and beach on the atoll, indicating the close association of the Pukapukan with his environment. The most important place names are marked on the accompanying maps (fig.1,*a*,*b*).

Climate

132 Records for the years 1930-35 (21) show that the mean temperature ranges between 80.9 and 83.9 degrees F., maximum temperature between 86.8 and 92, minimum temperature between 67 and 75 degrees. The average maximum absolute temperature throughout the year is 92.2 degrees and the average minimum absolute temperature is 67.4 degrees. Both minimum and maximum temperatures vary but slightly from month to month throughout the year, and the climate in this respect is equable.

For the period of record, the annual rainfall varies between 113 and 156 inches with an average of 128.41 inches. The season of heaviest rainfall is October to March, but heavy rains are recorded for April and May (1932, 132 1934), May and June (1931). In January 1935, after three days of con- 244 tinuous rain, 10 inches of rain fell in the next 24 hours. The amount and distribution of rainfall are important in the cultivation of swamp talo. A heavy rain floods the talo beds. After a heavy rain, the most desired weather is shady, cloudy skies, for if the rain is followed by brilliant sunshine for several days the submerged talo swamps may be heated to such a temperature before the water drains into the ground that the talo is killed. During the dry months, May to September, the rainfall is generally insufficient to bring talo to maturity. In bad years, the talo swamps may dry up altogether and most of the tubers die. It then requires from 6 to 12 months before the 132 new tubers are mature enough for food. Conditions brought about by scanty 731 rainfall must often in Pukapukan history have approached a state of virtual famine. The diet on such occasions as these would be fish and nuts exclusively. 262 With each adult on the island consuming from 7 to 10 nuts daily, and children proportionately fewer, the available supply of eating nuts must soon get very low.

132 Records for the year 1932 indicate prevailing winds from west through northeast blowing for 115 days in the year, from east through southwest for 226 days in the year. From May to October the prevailing winds (the trades) come from the east and southeast, and from November to April from the north and northwest. The northerly winds are much more variable than the trade winds, and the period from November to April is a time of storms, heavy winds, gales, and electrical disturbances. Pukapuka is just out- 731 side the regular hurricane belt, but there are records of severe visitations. A "tidal wave", probably accompanying a hurricane, which devastated the island about 300 years ago is mentioned in traditional history (p. 386). The

1. [See p. 18, category 116 — analyst.]

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latest hurricane of which there is definite record (7, 1915) occurred on January 9, 1914. This was preceded by a severe storm on December 14, 1913. Visitors who landed on Pukapuka on April 24, 1914, recorded that the high seas had washed away all but seven houses and flooded all the talo swamps. The wind blew down from the trees all the mature nuts and swept them into the sea. The people took refuge in the higher parts of the talo beds and subsisted on immature nuts and fish. The government schooner transported 52 Pukapukans to Rarotonga and settled them there until the Pukapukan food supply should reach normal again. A hurricane, which swept the Cook Islands in February 1935, was marked by exceptionally high seas in Pukapuka, but did no damage.

In former times, when no relief from outside was available, tidal waves and hurricanes must have produced famines on Pukapuka, or else reduced the imminence of famine by drowning the majority of the population. Previous to the tidal wave of 300 years ago, the population of the atoll was probably between 1,000 and 2,000. After the wave swept over the island, the population was reduced to 15 men and their families. Famines gave rise to many of the killings recorded in Pukapukan history, owing to quarrels over the control of the available food supply. It was no mere coincidence, therefore, that formerly the morning rising of the Pleiades in late May, heralding a season of good weather, was accompanied by dancing and feasting. The London Missionary Society church merely continues an old pattern when it holds special services in March to render thanks for safety during the preceding hurricane season.

Native Weather Lore

The compass directions are named after winds (fig. 2) which are associated with the villages as follows:

Ngake: Kallua, Mauake, Malangai, Malangai tonga, Tonga, Mulitonga, Keo, and Pua.
Loto: Wakalua.
Yato: Tokelau iti, Tokelau matua, Wakatiu, Palapu, Yulu, Laki.

The association of villages with wind names seems to be derived from the geographical location of the villages and the lands which they control. Ngake, lying to the eastward, controls all the winds that blow on the east and south side of the atoll. Loto, between the other two villages, controls the only wind blowing from the sea onto the outer beach opposite the reserve of Uta. Yato, to the westward, controls the winds that blow over the reserve of Niua and across the reef joining Wale to Kotawa. The names of these winds are used in the chants of each village for symbolic reference; no village, in composing a new chant, would mention the name of a wind belonging to another village. Though the matter is now very vague, it is possible that

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formerly each village, through its power over specific gods, thought itself able to control the named winds by praying to the appropriate god. No special magical technique would be required for this purpose and the matter would be left to the routine duties of the priest when consulting the gods in the god house.

The gods exercise a general control over the winds from the four cardinal directions (p. 311). The story of Kaliwi (1.) tells how a woman invokes each of the personified winds to blow her down from a tree top, but only the cold Tonga wind has strength to loosen her grip and send her tumbling to the ground.

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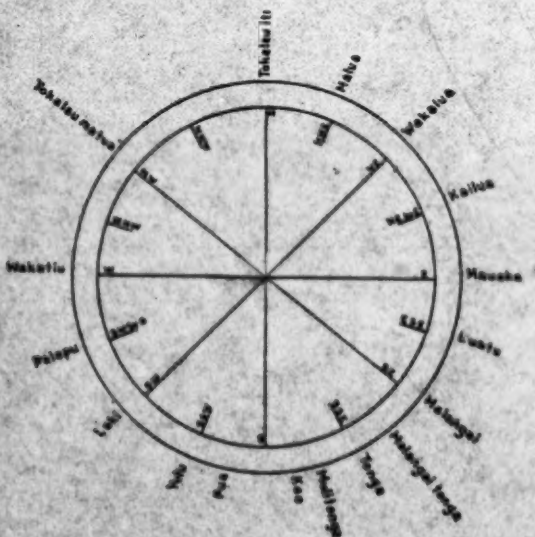

FIGURE 2.—Pukapukan winds and directions named therefrom.

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The word for side or direction is *kaokao*. Hence a person says *kaokao tokelau* (northern direction), *kaokao tonga* (southern direction.) The term *punga mataugi* refers to that portion of the beach which faces the direction of a wind blowing truly from *tokelau*, *tonga*, etc. To indicate precise directions when a wind is not blowing on the *punga*, the term *mao* is used. *E mao tokelau* is a wind from the north blowing a little to one side or the other of the true *tokelau* wind. This direction may be specified by adding the name of the next wind direction to the name of the *mao* wind; thus a wind blowing

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821 by the events narrated in the story of Lingutaimoa and her pet *manini* fish (1).

Seasons

821 The native Pukapukan year was divided into seasons (*vaia*). The sign
805 for the new year was the morning rising of the Pleiades, about the middle
132 of May. This ushered in a period of six moons of pleasuring, *ono maina*
221 *utuutu* (*utuutu* is a jumping game, and presumably the word is a symbol of good feelings engendered by sporting contests). Some informants dated this period from the rising of the Pleiades, others from the first new moon after the rising. Hence it comes between the May-June and October-November moons. The cool trade winds blow steadily from the southeast, deep-sea fish are plentiful, and the sea outside the reef in the lee of the atoll is always calm enough to render it possible to catch these fish. This season, though marked at times by a shortage of talo, is usually well provided with fish and nuts. It is the time for competitive sports, for deep-sea voyages, and for well-being. The period is introduced by feasting and dancing.

The six pleasure months are followed by six tapu moons (*ono maina ya*) from November to April. It is a period of heavy and changeable winds, possible hurricanes, excessive heat, and sultry weather. Deep-sea fish are not plentiful, and heavy seas sometimes make fishing arduous. Food comes from reef fishing and beach fishing for smaller fish. The supply of talo is plentiful if there has been no destruction of tubers during the preceding season. There was formerly little dancing, feasting, or chanting during this period, except at deaths. Compared with the moons of pleasure, these moons mark a time of stagnation of group activities, when only routine matters are kept in hand.

Another native classification gives three seasons, cutting across the dual division. The rainy season (*te vaia ua*), lasting from November to March, starts when the wind swings round from the south to the northwest and wild ducks are sighted flying southward. At this time the people of Yato village repair their houses and reroof them, because this village bears the brunt of the winds from the north and west. It is a season for good growth of trees, nuts, and talo; fishing is bad, but turtles come onto the outer beaches at the beginning of the period. The marine worm (*palolo*) is not known in Pukapuka so there is no *palolo* season to usher in this period. The season for fair weather (*te vaia lelei*) lasts from March to June when fishing is good and there is still much rain and plenty of food. The season of scarcity
221 (*te vaia to te onge*) lasts from July to October. There is little rain, the talo
312 turns yellow and does not produce tubers in any abundance. Growth of coconuts is marked by a midwinter pause; though not plentiful, they are generally sufficient for the needs of the population. Deep-sea fishing is good but water